AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method, comprising:

exposing a photo-sensitive medium to an optical intensity pattern under conditions that ~~inhibits or prevents~~ inhibit or prevent the optical intensity pattern from producing refractive index changes in the medium; and

then, heating the exposed medium to stimulate a pattern of refractive index changes that is responsive to the optical intensity pattern during the exposing.

2. (Original) The method of claim 1, wherein the condition includes that a temperature of the medium is lower than a temperature of the medium during the heating.

3. (Original) The method of claim 1, further comprising:

exposing one or more points or lines in the medium with light that causes photo-chemical reactions in the medium via multiple-photon absorption events.

4. (Original) The method of claim 1, wherein the heating produces the pattern of refractive index changes by causing a chemical reaction selected from the group consisting of polymerization of oligomers, stimulating deprotection of portions of polymers, and stimulating crosslinking of polymers.

5. (Previously Presented) The method of claim 1, wherein the medium includes a concentration of molecules that are able to neutralize photo-chemical reaction products produced by the exposing, the products being able to stimulate the chemical reaction that produces the pattern of refractive index changes.

6. (Original) The method of claim 1, wherein the optical intensity pattern is produced by interfering at least three mutually coherent light beams.

7. (Original) The method of claim 6, wherein the pattern of refractive index changes tracks the optical intensity pattern.

8. (Original) The method of claim 6, wherein the heating causes refractive index changing reactions in regions of the medium where the exposing activated photo-sensitizer molecules dispersed in the medium.

9. (Original) The method of claim 6, wherein the heating includes heating the medium to a temperature of a rubber-like phase.

10. (Original) The method of claim 6, wherein the heating produces a pattern of refractive index changes that is periodic and non-constant in three independent directions.

11. (Original) A photo-sensitive composition, comprising:

a medium capable of undergoing a refractive index changing chemical reaction, the medium further comprising:

photo-sensitizer molecules dispersed in the medium, the photo-sensitizer molecules to stimulate photo-chemical reactions in response to being exposed to light, products of the photo-chemical reactions being able to stimulate the refractive index changing chemical reaction; and

neutralizer molecules dispersed in the medium, the neutralizer molecules being able to neutralize a portion of the products of the photo-chemical reactions.

12. (Previously presented) The composition of claim 11, wherein one of the products and the neutralizer molecules is an acid and the other of the products and the neutralizer molecules is a base.

13. (Previously presented) The composition of claim 11, wherein the medium is a photoresist having a rubber-like phase, the index changing reactions being inhibited or prevented at temperatures below a transition temperature for the phase.

14. (Currently Amended) A method for making crystalline structures and devices, comprising:

providing a medium with photo-sensitizer molecules dispersed therein, the photo-sensitizer molecules to catalyze photo-chemical reactions in response to being activated by light of a wavelength, products of the photo-chemical reactions being able to stimulate refractive index changes in the medium; and

exposing the medium to an optical interference pattern that is produced by combining a plurality of mutually coherent beams of light of the wavelength, the exposing being done under conditions that ~~inhibits or prevents~~ inhibit or prevent the products of the photo-chemical reactions from causing the refractive index changes.

15. (Original) The method of claim 14, wherein the providing a medium includes providing a medium with a concentration of molecules to neutralize a portion of the products, the neutralized portion of the products being unable to cause refractive index changes in the medium.

16. (Original) The method of claim 14, further comprising: heating the exposed medium to stimulate the products to cause refractive index changes in the medium.

17. (Original) The method of claim 16, wherein the photo-sensitizer molecules are visible dye molecules and the products cause polymerization, deprotection, or crosslinking reactions in the medium in response to the heating.

18. (Original) The method of claim 16, wherein the heating produces an interconnected open polymerized structure.

19. (Previously presented) The method of claim 1, wherein the photo-sensitize medium comprises both photo-sensitizer molecules and photo-acid generator molecules dispersed therein.

20. (Previously presented) The method of claim 14, wherein the medium further comprises photo-acid generator molecules dispersed therein.

21. (Previously presented) The composition of claim 11, wherein the medium further comprises photo-acid generator molecules dispersed therein.

22. (Previously presented) The method of claim 1, wherein the optical intensity pattern is produced by exposing the medium to visible light.

23. (Previously presented) The method of claim 1, wherein the optical intensity pattern is produced by exposing the medium to visible light ranging from 470 nm to 560 nm.

24. (Previously presented) The composition of claim 11, wherein the photo-sensitizer molecules are activatable by visible light.

25. (Previously presented) The composition of claim 11, wherein the photo-sensitizer molecules are activatable by visible light ranging from 470 nm to 560 nm.

26. (Previously presented) The method of claim 14, wherein the light is of a visible wavelength.

27. (Previously presented) The composition of claim 14, wherein the wavelength of light ranges from 470 nm to 560 nm.